



SATURDAY, FEBRUARY 7, 1874.

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CATECHISM OF THE LOCOMOTIVE.

PART IV.—(CONTINUED.)

QUESTION 46. What is meant by lead?

Answer. By lead is meant the width of the opening of the steam-ports at the beginning of the stroke of the piston. On the steam side of the valve it is called *outside-lead*; on the exhaust side *inside-lead*. In fig. 26 the opening *h* of the steam-port is the outside-lead and *h'* the inside-lead.

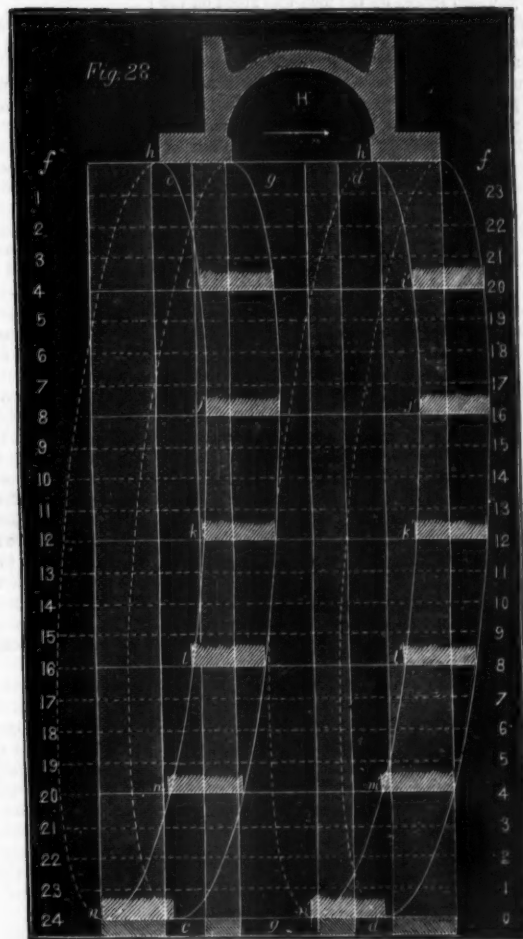
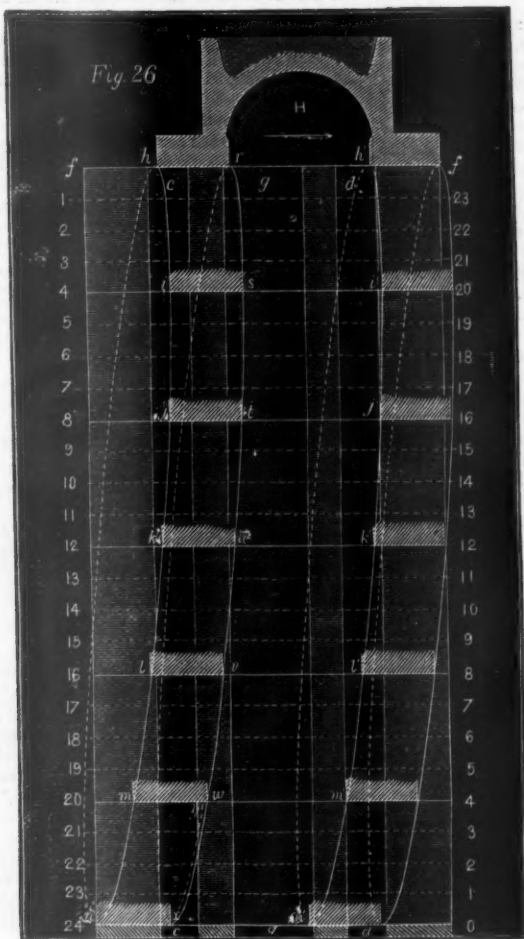
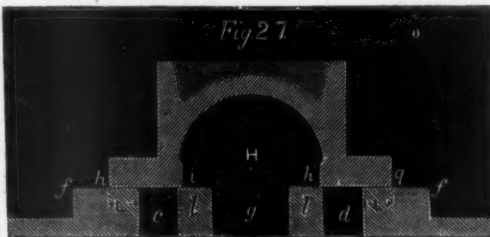
QUESTION 47. What is meant by the travel of a valve?

Answer. By the travel we mean the motion of the valve back and forth, or in other words its stroke. If the arms of the rocker are of the same length, the travel of the valve is equal to the throw of the eccentric. For the preceding illustrations we have selected an eccentric with three inches throw, which is the travel of the valve.

QUESTION 48. How is the steam made to work expansively with a slide-valve?

Answer. By giving the valve what is called lap. That is,

Answer.—It delays the release of the steam. Thus in fig. 26 the valve has $\frac{1}{2}$ in. inside lap. The motive-curve *r, s, t, u, v, w, x* shows that the release takes place during the back stroke at 21 $\frac{1}{2}$ in. If now there was no inside lap, the dotted line *y, z* would represent the exhaust edges of the valve, and the release would then occur somewhat earlier, or at 21 in. For this reason, no inside lap is usually given to valves for engines which run at a high rate of speed, as it allows too little time for the steam to escape. In fact, in some cases, what is called *inside clearance* is given to the valve; that is, the valve as shown in fig. 28, when it is in the middle of the valve-face, does not entirely cover the steam-ports. The effect of this is just the reverse of that produced by inside lap; that is, it causes the release to occur earlier in the stroke.



by allowing the edges of the valve when it is in the center of the valve-seat to overlap the edges of the steam-ports, as shown in fig. 27. Where this overlap, *L L*, is on the outside of the valve, it is called *outside lap*; when on the inside, *l l*, *inside lap*. When a valve has lap, those portions of the face *a, t*, and *p q* which cover the steam-ports, being wider than the ports, therefore occupy some time in moving over them, during which time the steam is enclosed in the end of the cylinder, as there is then no communication either with the steam-chest or the exhaust-port. This action is shown very clearly by the motion-curves in fig. 26. The valve in this case has $\frac{1}{2}$ inch lead. At $4\frac{1}{2}$ inches of the stroke of the piston the valve has moved as far as it will go in that direction, and the steam-port has its maximum width of opening. From that point the valve will begin to close the steam-port, and at $14\frac{1}{2}$ inches of the stroke the port will be entirely covered, and the steam therefore be cut-off. The port will remain closed until the piston has moved 21 $\frac{1}{2}$ inches, when it will be observed from the motion curve *r, s, t, u, v, w, x*, that the port *c* is opened to the exhaust and the steam-escapes, or, as it is technically called, the release takes place. From the time the steam is cut-off, to the time it is released, it works *expansively* in the cylinder.

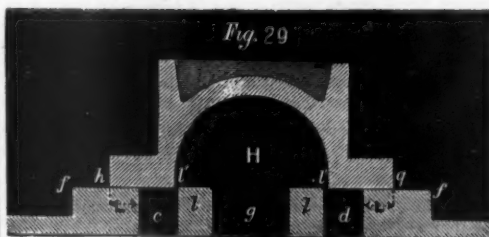
QUESTION 49. What relation is there between the amount of lap and the degree of expansion?

Answer. The greater the lap the shorter will be the period of admission of steam, and, consequently, the more time and space for expansion.

QUESTION 50. What is the effect of inside lap?

Answer. The valve-face is the surface of the valve in contact with the valve-seat.

* In speaking simply of lap, outside lap is always meant.



QUESTION 51. With the same outside lap, what is the effect of changing the travel of the valve?

Answer. By increasing the travel, the period of admission is increased and that for expansion lessened; and by reducing it, the admission is lessened and the degree of expansion is increased. This is shown by the motion-curves in fig. 28, in which the same valve and ports are represented as are shown in fig. 26, but the valve has a travel of 5 instead of 3 inches. The valve also has the same lead. By following the motion-curve *h, i, j, k, l, m, n*, it will be seen that the steam is thus admitted up to 21 $\frac{1}{2}$ inches of the stroke of the piston, and the period of expansion, as compared with that in fig. 26, is correspondingly lessened. It will also be seen by comparing fig. 26 with fig. 28 that with the short travel of the valve the ports are not opened so wide as they are when the travel is increased. This evil is practically obviated, however, by making the ports so large that with a comparatively small opening they will still have area sufficient to admit enough steam to fill the

cylinders, and it is known that opening the steam-ports less than the whole area in all cases ceases to be advantageous in facilitating the passage of steam into the cylinder.

QUESTION 52. How is the exhaust effected by lap and lead?

Answer. The steam is released earlier in the stroke in proportion as the amount of outside lap and lead is increased, but the steam-port is also closed to the exhaust, or *suppression*, as it is called, occurs earlier with lap and lead than without. Thus in fig. 25 it will be seen that at the beginning of the stroke both ports are entirely closed; in fig. 26, however, in which the valve has both lap and lead, the port *d* is nearly wide open at the beginning of the stroke, and by following the motion-curve *r, s, t, u, v, w, x*, which represents the position of the exhaust edge of the valve, it will be seen that the steam was released from the port *e* before the piston had completed its stroke, or when it had still nearly four inches to move. In fig. 25 the port *e* is not opened to the exhaust until the commencement of the stroke, but it remains open to its completion, whereas in fig. 26 it is closed, or suppression occurs, at 18 inches of the return stroke. The latter is, however, of little practical importance if the port is opened sufficiently to the exhaust to allow all the steam in the cylinder to escape before suppression occurs.

QUESTION 53. How does the action of the connecting-rod influence the motion of the valve in relation to the piston?

Answer.—By delaying the movement of the crank in the backward stroke of the piston, and accelerating it in the forward stroke. This will be best explained by reference to fig.

14, in which the piston is represented in the center of the cylinder, or the middle of the backward stroke. If now we take a pair of dividers set to a length equal to that of the connecting-rod, and from the center, *f*, describe an arc of a circle, *a, b*, from the center of the shaft, and through the lower half of the circle which represents the path of the crank pin we will find that the point of intersection, *a*, falls short of the vertical line, *c, d*, and that the crank-pin has not made quite one-quarter of a revolution while the piston was moving through the first half of the backward stroke. By referring to fig. 21, in which the piston is again in the middle of its stroke, but is moving forward, and by describing another arc of a circle, *b, a*, from the center of the shaft and intersecting the path of the crank-pin, it will be seen that the latter has moved more than a quarter revolution, while the piston has made the first half of the forward stroke. Owing to this *angularity*, as it is called, of the connecting-rod, the crank-pin is behind the piston during its backward stroke and ahead of it during the forward stroke. As the valve is moved by the eccentric, and it in turn by the shaft and crank, any irregularities of the latter are of course communicated to the valve. We therefore find, by referring to fig. 26, that the point of cut-off occurs during the backward stroke at $14\frac{1}{2}$ inches, and during the forward stroke at 12 inches. A similar inequality is observable in the points of release for the front and back strokes. It is not, however, a matter of very great practical importance with stationary engines which run at comparatively slow speeds; but if it is thought desirable, the period of admission and the point of release for both strokes can be equalized, either by giving the valve more lead or lap at one end than the other, or by making the one steam-port wider than the other. The mechanism employed for moving locomotive slide-valves furnishes us with

the means of modifying their motion in relation to that of the piston, and thus equalizing the periods of admission and release for the front and back strokes. The methods of doing this will be more fully explained hereafter.

Contributions.

The Fireless Locomotive.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with great interest Mr. Buel's paper on this engine, in your number of January 24, and would like to see some further investigation of it, of a like scientific character. As a provocative of such investigation, I propose to controvert certain claims of the inventor, which are partly indorsed by Mr. Buel. He says: "The inventor wished to produce a safe, cheap and simple motor for street cars;" and it is evident that, "if efficient, this engine satisfies many of the conditions necessary in street-car propulsion."

As to safety, this engine, compared with one with a common multifue boiler, fitted with common safety valves, merits commendation; but compared with one with a boiler made up of small water tubes, like some used on steam carriages forty years ago, it is inferior, because it contains power to run a whole trip, and a collision may rupture it, and destructive effects proportionate to the power may follow. Moreover, the strains imposed on one of those engines which I saw at East New York may in time begin a rupture of the boiler. The engines were fastened to the boiler, and the brackets that carried the boiler (or reservoir) did not carry it easily; and there was excessive pitching, which jerked up the men who stood on the footboard so high as to indicate strains that in time would doubtless dangerously weaken the reservoir. The water-tube boilers, on the contrary, had no such strain; and, if made thick enough to endure long against rust, would bear thousands of pounds pressure per square inch; and, if ruptured, would not liberate all their power at once, and would not do harm outside, as was several times proved. In short, a boiler can be made that will be perfectly safe for passengers, even if it be burst; but these large reservoirs would be terribly destructive if burst; and collisions may burst them, and even the ordinary wear and tear of the one I saw at work is likely to produce weakness that will allow the steam pressure to burst it whenever a heavy jolt occurs. This danger may be lessened by better construction, but I deem it impossible to make it so safe as a street engine ought to be.

As to cheapness, the cost of carrying extra weight over the road will affect it; so will the stationary boilers and their attendants. I regret that Mr. Buel has not reported the weight of the engine he examined, and compared it with that of a light locomotive of equal power. But he has reported some data which show excessive weight. The weight of water in the reservoir was 1,236.3 lbs.; the weight of steam shown by the indicator was 147.15 lbs.; the pressure at starting was 142, and at stopping was 22 lbs. per square inch. Dividing 1,236.3 by 147.15 gives 8.4 lbs. of water to make 1 lb. of steam. But there was a condenser on one of the engines, which Mr. Buel does not mention, and a tank in which ice was used. If all in it were ice, 6.78 lbs. would be required to condense 1 lb. of steam. Hence 15.18 lbs. weight must be carried for each pound of steam used on a trip; for I presume it is not intended to exhaust visible steam in streets.

A boiler weighing 300 lbs., including its constant charge of water and fuel, would make steam at the rate above shown (147.15 lbs. in 35.5 minutes). Add for fuel 21 lbs., and we have for boiler, water and fuel, 300+147.15+21=468.15 lbs. to set against 2,233.73 lbs., plus the weight of the reservoir, tank and extra weight of frame, running gear, engines, etc., to carry the extra load. The weight of the reservoir, if $\frac{1}{2}$ in. thick, must be over 1,200 lbs., and the lagging, which is very thick, must add considerably to the weight; altogether they will probably amount to eight times the weight of a fire steamer of equal power.

This extra weight, of at least a ton and a half, will tell upon such rails as we have on street and suburban lines, and will diminish any economy that may result from the new system. I doubt the presumed economy altogether, and should like to see an estimate of it.

Mr. Buel countenances the claim that "men of ordinary intelligence can be used as engine drivers, where the steam is furnished without care on their part." That implies that a man of the ordinary intelligence found in men who work at the rate of wages paid to car drivers could not be easily taught to run a steam car that is fitted as well as may be to help him keep the boiler in order, and that is examined every day, or every trip, by an engineer at the depot. I think this view erroneous, and that a man who is fit to drive horses can soon be taught to drive a steamer of this class on a railway where a general stoppage could be avoided by putting the car off the track. But Mr. Buel probably thinks of common boilers, that may explode disastrously; and he would be in the right if we could not make boilers such as I have referred to.

The advantages claimed for the new engine do not all exclusively belong to it. An engineer, soon after a recent trial of it, asked me if I was the inventor of it. I answered no; and he remarked that he heard me read a paper before the Polytechnic Club, which, as he recollected it, set forth some of the features of this engine. I did not at the moment recollect this paper, which was read twelve years ago; in fact, I had abandoned the features he alluded to. At a later period, the Metropolitan Railway worked somewhat on the same system—that of storing heat.

My proposal was to charge the boiler with hot water, as full and hot as practicable—enough water for the trip; to have less heating surface and more water room than usual, and to have a clean fire, in a fresh portable grate, put in at each terminus. The fire and water would last through an ordinary trip; but, in cases of delay or great resistance, there would be an injector to feed from a small tank, and a small box of fuel.

The pressure gauge and the damper would be all that the driver would have to look after, so that he could keep his eyes on the road, to avoid collisions and look for passengers. I gave up this scheme because I did not like to have in store more hot water than is necessary for steadiness of working.

While I hold that a steamer with fire, with such a boiler as I have indicated, and something better than the common safety valve—which, on the authority of experimenters at the Novelty Works, is denounced as a delusion—is far safer than the new engine, and in all respects more agreeable and economical, I believe that if ever the capitalists of New York shall be so foolish, or the politicians so knavish, as to build an underground railway, and work it by locomotives, this kind of engine will be better for it than a locomotive of the sort used on the Metropolitan Railway. The *Engineer* seems to be of this opinion.

After such criticism, I ought to express my admiration of the liberality, enterprise, perseverance and ingenuity of Dr. Lamm and his supporters. They deserve the gratitude of this abused community for having produced a motor much safer and better than horses, and safer than the boilers preferred by practitioners, on account of supposed economy. But reform, long ago commenced, of the old light steamer, will, I am confident, underwork and render useless the new engine, except in cases where the gases from a fire ought to be prohibited.

J. K. FISHER,

No. 80 Broadway, New York.

The Master Mechanics' Association—Need of Attention to Circulars of Inquiry.

TO THE EDITOR OF THE RAILROAD GAZETTE:

With this I send you copies of five circulars, from committees of the Master Mechanics' Association, now ready for distribution. Up to the present, seven circulars have been received, but only five have been printed. The General Supervisory Committee will be under very great obligations to you and the interest of the Association will be enhanced if through the columns of the *GAZETTE* anything can be said that will secure better attention to circulars of the various committees. These circulars have been prepared by the committees and are now sent out for the purpose of gathering information on each subject, as it presents itself to men of different experience in different parts of the country, and it is earnestly hoped that they will meet with a hearty and general response.

Many of the questions are directly affected by the climate, and unless information is received from all quarters and the subject examined as it is in practice in the different sections of country, the report will fail to create the interest that its importance demands. For instance, the Committee on "Machinery for Supplying Water to Tanks," a majority being engaged in business in a mild climate, may from their experience be able to furnish the Association with an admirable plan for supplying water to tanks in that section, and yet, on account of the severity of our Northern winters, it would be wholly impracticable in New England, Canada, and the extreme North. Here, then, will be an obligation resting on the Master Mechanics of the North to see that the Committee is fully supplied with the information necessary to make a report that will meet the wants of all roads, North and South, in this particular. The subject of "Steel Tires" is one more or less affected by the climate, particularly in regard to the manner of securing them on the wheel-center. Shrinkage is the general method now employed; but if a proper amount is given for warm weather, in cold it is found to be too much, and the tire breaks. The number of tires broken, as shown by the report of the Committee of last and previous years in our Association, and the fact that a large majority of the tires broken were not reported to the Committee, show conclusively that a better method of fastening is certainly desirable. There are men in the machinery departments of railroads who have given this matter special attention and whose experience would be valuable to the Committee if they could only be induced to take the necessary time and trouble to give their views on the subject.

The durability of steel wheels and axles as compared with iron is also a question of very great importance, and much can be said for and against their use; but if the responses to the circular are as full and general as they should be, there is no doubt that the question could be definitely settled without each road being at the expense of testing the matter for itself. And herein lies the chief value of the Master Mechanics' and other similar Associations; members here obtain information derived from long experience of others that can be obtained in no other way.

The Committee on Safety Valves and Pressure Gauges are making every effort to procure the necessary information from which to compile a valuable report; they have sent, through the Secretary, circular-letters to most of the steam-gauge manufacturers of the country, asking information as to the manner of constructing and testing steam gauges, and a full report in regard to these important points is confidently expected. The "Pop" valve spoken of by the Committee is a matter that is receiving considerable attention, and in some cases has been made the subject of special legislation by the local authorities of some of our large towns and cities along the lines of different roads, they voting that, while it may be a very good thing to keep boilers from exploding and flying off on a tangent, it does not have the same effect on horses standing in the vicinity, and have accordingly prohibited its use inside their corporations. There is no doubt that some modification of this valve is necessary, and the Committee will be glad of any information that will enable them to recommend a better valve or a plan to remove the objection to this. "Continuous train-brakes" is another subject of the utmost importance. Several able reports have been made to the Association, showing that railroads and the traveling public are fully alive to the necessity of having something for this purpose on every train, and but few roads are now without a continuous train-brake of

some kind. The best of them are not perfect, however, and there are many improvements that can and should be made. The circular of the Committee is admirably calculated to draw out the necessary information. If every master mechanic will but answer the first and last questions of the Committee satisfactorily to himself, the Association will have a report covering all the points, and one that will defy successful contradiction as to what is requisite to furnish a railroad company with a reliable continuous train-brake, and also establish the fact that no road can afford to be without them.

Will the members answer the circular?

J. H. SETONEL,
Master Mechanic Little Miami Railroad.

Sleeping Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Having of late had occasion to travel frequently at night, I have some suggestions to offer to those officers who have charge of sleeping-car arrangements. In the first place, the practice, now I think common to all roads, of allowing sleeping-car porters to expect twenty-five cents from each passenger for blacking his boots, is a bad one and should be put an end to; there is an appearance of extortion about the proceeding, and the service done is not worth half the amount. I have heard several passengers complain of the custom.

2d. Sleeping cars should be kept dark and cool.

3d. No noise should be permitted after a certain hour, say 9 p. m. The rushing through of brakemen and other employees at stations should be discountenanced; especially should those who have occasion to enter or leave the car be enjoined not to bang the doors.

4th. Tickets should be examined before the passengers retire, or in the morning. It is not pleasant to be awakened in the middle of a delightful sleep. If a change of conductors makes it necessary to visit the tickets, let the porter warn the passengers before they retire and ask them to entrust their tickets to him, so that he can show them to the conductor.

On some roads all these points are attended to; but on a good many they are not. Especially between New York and Philadelphia by the midnight trains have I noticed too much light, too much noise, too many employees passing through the cars, and too much anxiety on the part of the porter to get the passengers out of the cars in the morning. H.

A Brake Question.

PATERSON, N. J., January 10, 1874.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you please favor me with an answer to the following question, in the column of your paper devoted to correspondents:

What amount of fuel, say wood, will a Westinghouse air brake consume on a locomotive engine taking steam from boiler of same per hour, making 42 strokes per minute?

MECHANIC.

[The conundrum is too hard for us; so we give it up and hope some of our correspondents will answer it.—EDITOR RAILROAD GAZETTE.]

Intelligence in Trainmen.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of the 24th of January I notice a communication relative to "Flagging Trains and Estimating Distances," to all of which no doubt all practical "railroad men" will most heartily subscribe, except the intimation or natural inference in the last clause, from which one might readily infer that a superintendent should possess all the brains and all other officers and employees, especially "trainmen," should have a vast cavity in their cranium, sponge-like to absorb the thoughts and ideas with which the brain of a superintendent must under such circumstances be teeming. I would have trainmen of capacity, of intelligence, thoughtful men, men of brains, men capable of making a time-card; then they can understand one. In this way it seems accidents would be materially lessened, other things being equal. "C."

The Master Mechanics' Association—Circulars of Inquiry.

The following committee circulars of inquiry have been issued:

SAFETY VALVES AND TESTS OF PRESSURE GAUGES.

The undersigned, a Committee appointed at the last annual Convention of the American Railway Master Mechanics' Association, to report on the "Best Form of Safety Valve or Method of Relieving Boilers of Overpressure, and the Best Way of Testing Pressure Gauges," invite your attention to the following questions, and respectfully request you to reply to the same:

1. From your experience, what do you consider the best method of attaching safety valves to locomotive boilers?
2. What are your objections, if any, to lever safety valves?
3. What are the advantages or disadvantages of direct-action spring safety valves?
4. Do you find any detriment to boilers or any injurious lifting of water from the use of the Richardson direct action or "pop" valve?
5. What do you advise as a minimum diameter of valve, where two are used, on coal-burning boilers of the common 16x24 inch cylinder engines, with, say, a grate surface of 14 square feet?
6. Have you any improvement or modification of the Richardson valve in use? and, if so, will you send drawing or description of same?
7. What is your method of testing pressure gauges?
8. Do you test your locomotive gauges at regular intervals, or only when reported by the engineers?
9. State the name of the maker whose gauges give you best satisfaction, and state the advantages of the same.

Respectfully yours,

CHARLES R. PEDDLE,
St. Louis, Vandalia & Terre Haute Railroad,
W. F. RAY,
Toledo, Wabash & Western Railway,
S. KEELER,
Flint & Pere Marquette Railway,
Please address reply to CHAS. R. PEDDLE, Master Mechanic

St. Louis, Vandalia & Terre Haute Railroad, Terre Haute, Ind.

NARROW AND BROAD-GAUGE ROLLING STOCK.

The Committee appointed at the last meeting of the American Railway Master Mechanics Association, on the subject of "Narrow and Broad Gauge Rolling Stock," beg leave to request your answers to the following questions:

1. What is the gauge of your road?
2. What is the diameter of cylinders, length of stroke, number and diameter of driving and truck wheels, weight on driving wheels and gross weight of each class of engine on your road?
3. What is the gross load hauled by each class of engine (including engine and tender), pressure of steam, points of cut off, grades, curves, speed in miles per hour, also the dead weight carried per ton of paying weight in each case? Give, also, the kind of tires—plain or flanged—and their position on the engines.
4. What is the weight of each class of freight cars (four and eight wheeled) and the loads they actually carry? Give weights and loads carried by each class.
5. Give also the cost of repairs of engines per mile.

Respectfully yours,

W. S. HUDSON, Rogers Locomotive Works,
J. A. DUNGIN, Pittsburgh Locomotive Works,
H. N. SPRAGUE, Locomotive Builder, Pittsburgh, Committee.

Please address replies to W. S. HUDSON, Rogers Locomotive Works, Paterson, New Jersey.

CONTINUOUS TRAIN BRAKES.

The Committee appointed by the American Railway Master Mechanics Association at its last annual meeting, to report on the subject of "Continuous Train Brakes," would respectfully solicit your opinion and answers to the following questions, and desire that you will make them as full and comprehensive as possible upon this subject, as it is one of much importance to the railroad interests of the country. The value of our conclusions will depend almost entirely upon the facts and correct opinions furnished the Committee, and from which they will be obliged to obtain the material for their report.

Please reply previous to the 20th of March, 1874:

1. In your opinion, what are the requirements in a power brake to produce the best results, and necessary to accomplish the end desired in the most perfect manner?
2. Are you using a continuous brake on the equipment on your road? If so, what kind, and by what name is it known?
3. Is it efficient and reliable under all ordinary circumstances; and in its action and results is it all that is to be desired? Do you know of instances where, in your opinion, the use of this brake has been the means of saving life and preventing serious destruction of property? If so, please relate the circumstances.
4. Will the brake you describe remain set on all the cars after being applied, even if the train should become severed by accident?
5. Do you consider the feature referred to in the fourth question a matter of vital importance, as a means of preventing—at least in many cases—serious results in the destruction and injury that so frequently attend accidents of this character?
6. Do you know of any brake that will apply automatically in case the train should become severed or any part of it thrown from the track? If so, please give a description of the device.
7. Do you consider a brake having the above automatic attributes of sufficient value and importance to warrant its general adoption?
8. Have you in use, or a knowledge of, a power brake applied to the driving-wheels of locomotives? If so, give a description of the same, and your opinion as to its merits, with your reasons therefor, for or against such application of braking power.
9. In your experience, is the brake, when thus applied to the driving-wheels, found to be destructive or injurious to the several parts of the locomotive affected thereby?
10. If found to be injurious, what proportion does such extra wear and the cost of repairs bear to the benefits derived therefrom?
11. If the application of brakes to the driving-wheels of locomotives hauling passenger trains is desirable, would the results, in your opinion, be equally beneficial if applied to those hauling freight and other trains, and those doing switching service?
12. In your opinion, can a road be as safely and economically operated, all things considered, by the use of hand brakes, or a similar braking power, as by the use of a good system of continuous brakes; and will not the advantages derived from their use more than compensate for their original cost and maintenance in good and perfect condition thereafter?

Yours respectfully,

R. WELLS, Master Mechanic,
Jeffersonville, Madison & Indianapolis Railroad;
L. H. WAUGH, Master Mechanic,
Kansas Pacific Railway;
E. B. GIBBS, Master Mechanic,
Louisville, Cincinnati & Lexington Railway, Committee.

Please direct your reply to R. WELLS, Jeffersonville, Ind.

STEEL TIRES, WHEELS AND AXLES.

The undersigned, a Committee of the American Railway Master Mechanics Association, to whom was referred the subject of "Steel Tires, Wheels and Axles, also Chilled Tires," respectfully call your attention to the accompanying series of questions, and solicit such information as you may be able to furnish on the topics therein embraced.

It is obvious that, to enable the Committee to present a report which shall possess any real value, they need to have before them statements from as many sources as possible, and that these be as full and accurate as practicable.

The Committee hope you will promptly favor them with replies to their interrogatories, as complete and definite as possible. In respect to circumstances of breakage or removal of tire, they especially desire full information.

As it is desirable that the details of the performance of tires, etc., should be brought up to a uniform date, we suggest the first of March as that date, and hope to receive the reports during that month.

Questions Relating to Steel Tires.

1. How many steel tires, and of what manufacture, are in use on your road?
2. Please furnish a detailed report of the performance of each set, stating the maker's name, the number of the set, thickness when fitted for use, number of times turned, present thickness, mileage, diameter of wheel, weight of engine; also weight on drivers and nature of service.
3. Have any steel tires broke while in use on your road?
4. Please furnish statement of circumstances attendant upon such breakage: as, the season of the year, the mode in which the tire was secured, the amount of shrinkage when set, the nature of the fracture, and extent of the damage in consequence thereof.
5. Have any steel tires on your road been removed from wheels, on account of being worn so thin as to be considered unsafe? If so, of what thickness were said tires when removed, and what indications caused you to doubt their safety?
6. Is the location of your road such as to make your tire service particularly severe, on account of heavy grades or extremely cold weather?
7. What do you consider the best method of fastening steel

tires to the wheels, and what rate of shrinkage do you allow in setting?

Chilled Tires.

8. How many chilled tires, and of what manufacture, have you in use on your road?
9. Please furnish detailed report of the performance of each set, mileage, diameter of wheel, weight of engine, and nature of service.

Wheels.

10. How many steel wheels, and of what manufacture, are in use on your road, under engines or cars?
11. In your experience, how do steel wheels compare with those of iron, in point of durability, safety and economy?

Axles.

12. How many steel axles, and of what manufacture, are in use on your road, under engines or cars?
13. From your own experience, do you think that their greater durability and safety, as compared with those of iron, would justify the difference in cost?

Yours respectfully,

J. N. LAUDER, Northern (N. H.) Railroad,
F. A. WAITE, Boston & Maine Railroad,
ALBERT GUNGS, Worcester & Nashua Railroad, Committee.

Please address your reply to JAMES N. LAUDER, Northern (N. H.) Railroad, Concord, N. H.

SUPPLYING WATER TO TANKS.

The undersigned, a Committee appointed at the last annual Convention of the American Railway Master Mechanics Association, to report upon the subject of "Machinery for Supplying Water to Tanks, Giving Description of Engine, Windmill or Device, with Cost of Working the Same," beg leave to call your attention to the following questions, and solicit an early reply to the same:

1. What arrangements have you for supplying water to tanks at water stations on the line of your road?
2. Please give description of engine, steam-pump, windmill, horse-power or other device employed for the purpose, the number of gallons raised per day, or for each twenty-four hours, and the cost of working the same; or, if the tanks are supplied by a natural fall, describe the kind of pipes used to convey the water, and the best method of putting them down; the kind of bulkhead or dam at the fountain, and best method of keeping the strainer from being choked up or damaged from driftwood, etc.; also describe the means of protection you have found most effectual in frosty weather for pipes under ground or otherwise situated, and for tanks in open air and machinery in buildings.
3. Describe what arrangements you have for delivering water from tanks to the tenders, and state whether it can be practically kept free from leakage and safe during frosty weather.
4. Describe the best method you are familiar with for supplying water to tanks.
5. In your description give, as far as convenient, drawings or sketches of the parts you describe; and, where practicable, statements of the cost of the work.

Respectfully yours,

J. L. WHITE, Evansville & Crawfordville Railroad,
J. H. FLYNN, Western & Atlantic Railroad, Committee.
HOWARD FRY, Erie Railway.
Please address your reply to J. L. WHITE, Master Mechanic Evansville & Crawfordville Railroad, Evansville, Ind.

The Master Car-Builders' Association Committee Questions.

The circulars for information prepared by the various committees of the Master Car-Builders' Association, and intended to elicit information on which to base the reports to be made at the next annual meeting have been published, and a part of them are given below:

HEATING, VENTILATING AND LIGHTING PASSENGER CARS.

- 1st.—What kind of heating apparatus do you recommend for heating passenger cars?
 - 2d.—What kind of fuel do you recommend?
 - 3d.—Do you recommend that the heating apparatus be put underneath the car, or inside of it?
 - 4th.—Do you recommend a system of heating and ventilation combined?
 - 5th.—How many cubic feet of fresh air do you think should be supplied to each passenger per minute in order to keep the air in a car healthful?
 - 6th.—In your opinion, what is the best way to admit this quantity of air into a car?
 - 7th.—By what method would you remove the impure air from cars in winter, when only common stoves or heaters are used?
 - 8th.—By what method in summer?
 - 9th.—Do you know of any means by which cars can be heated and ventilated in winter and cooled and ventilated in summer?
 - 10th.—What do you recommend for lighting cars?
 - 11th.—In your opinion, what is the best way to protect cars from damage by fire, in case of accident to train?
 - 12th.—How are the cars on your road heated?
 - 13th.—How are the cars on your road ventilated?
 - 14th.—How are the cars on your road lighted?
- Any other information, bearing upon the subject, not suggested by the above questions, will be cheerfully received by the Committee. Address replies to the Chairman, W. E. CHAMBERLAIN, Boston & Albany Railroad, Allston, Mass. The other committeemen are V. D. PERRY, Hartford, Providence & Fishkill, and A. GLEASON, Old Colony Railroad.

This circular is addressed to master car-builders and others having charge of passenger cars.

DRAW-BARS AND BUFFERS.

- 1st.—What kind of a draw-bar do you use on your road?
 - 2d.—What kind of buffer or dead wood would you recommend?
 - 3d.—Do you approve of the old style of buffer where blocks are on a timber over the draw-bar?
 - 4th.—Which do you think the best to use on freight cars, cast or wrought-iron draw-bars?
 - 5th.—Would you have the dead woods meet before the springs in draw-bars are exhausted?
 - 6th.—Would you advise the use of a self-coupling draw-bar?
 - 7th.—Do you know of one in successful use; if so, what road and whose make?
 - 8th.—Do you think a self-coupling draw-bar would lessen accidents if used?
 - 9th.—Do you think it would be advantageous to adopt a uniform draw-bar for all roads; if so, what kind would you recommend, and how attached to the car?
 - 10th.—Please give us your ideas in your own way, and illustrate them if possible by drawings on this whole subject.
 - 11th.—Have you had in use on your road, at any time, a self-coupling draw-bar; if so, what was the result of trial?
 - 12th.—What is the comparative breakage between wrought and cast-iron draw-bars?
 - 13th.—What is the comparative expense of keeping in repair of wrought and cast-iron draw-bars?
- All replies should be addressed to the Chairman of Committee, F. D. ADAMS, Boston & Albany Railroad, Springfield, Mass.

The other members are C. A. Smith, late of Erie Railroad, Jersey City, N. J., and Joseph Jones, New York Central & Hudson River, West Albany, N. Y.

CAR BODIES.

The Committee, which is instructed to report on the most suitable size (length, width and height) of car bodies: the best manner of framing and putting together, the most suitable size and kind of lumber to be used for the same, ask replies to the following questions:

Freight Cars.

- 1st.—What length should a freight car body be built to carry general merchandise?
 - 2d.—What width should the same be built?
 - 3d.—What height from top of floor to under edge of plate?
 - 4th.—The strongest and most durable manner of construction?
 - 5th.—The size of bottom timbers, the size of end plates, size of door and corner posts, of intermediate posts, braces and carlins, and side plates?
 - 6th.—The best kind of material for frame work?
 - 7th.—The best kind of material for flooring and siding and the thickness of each?
- And any other suggestions that you may please to make to assist the Committee in making a full report.
- Your Committee are fully impressed with the importance of a properly built freight car, combining strength, durability and uniformity upon all of our respective railroads—with so much interchanging of cars as we now have and which must (in the opinion of your Committee) be extended. And we know that the only way that the information sought can be obtained is from the experience of the respective MASTER CAR BUILDERS, and we, your Committee, do therefore very respectfully ask that you will give us your opinions upon the subject referred to, with any sketch or tracing that you may please to send us."

Passenger Cars.

- 1st.—What size passenger car bodies, and how many passengers should each car seat, in view of economy to build and keep in repair, and for safety on four-wheeled truck?
 - 2d.—Is there any advantage in making the sills in two pieces in place of one, and the car so framed as to admit of a circulation of air, from the bottom, between the inside lining and the outside paneling?
 - 3.—Would such ventilation preserve the frame work of the car from decay?
 - 4th.—Can a car body be put together in a way as to give circulation of air between inside and outside lining of cars, and at the same time be built sufficiently strong to give safety and durability (in ordinary sense) to the car?
- Besides a reply to the foregoing questions any suggestions will be thankfully received by the Committee.
- The Committee consists of I. W. Van Houten, C. A. Smith, and Samuel Campbell. Answers are to be directed to the Chairman, I. W. VAN HOUTEN, office Pennsylvania Railroad Company, West Philadelphia.

CAR ROOFS.

The replies are to be sent to C. A. SMITH, Chairman, No. 113 Liberty street, New York. The other member of the Committee is George Hackett, Elizabethport, N. J., of the Central Railroad of New Jersey:

- 1st.—Do you use tin or other metal, or canvas, for the outside covering on passenger car roofs? State quality of material used, and how applied.
 - 2d.—Have you on your road what is known as the double-board roof; if so, how are they put on?
 - 3d.—Have any trouble in keeping them tight; if so, where do they fail and how do you remedy the evil? Please give your experience and opinion of this roof as fully as possible.
 - 4th.—Have you any of the Winslow iron roofs on your road? If so, state if you have any trouble in keeping them tight.
 - 5th.—Have you any trouble in repairing them, when broken by accident?
 - 6th.—Does the iron in these roofs rust out; if so, how soon after being put in service?
 - 7th.—Would you recommend this roof for freight cars; if so, why; if not, why?
- Please give your experience and opinion of this Winslow roof, as fully and clearly as possible.
- 8th.—Do you use tin on your freight car roofs; if so, what size and kind, and how applied; how many nails per sheet used, and at what points?
 - 9th.—Do you have any trouble in keeping a tin roof tight; if so, where do they fail?
 - 10th.—What would you recommend as the best material to paint wood and metal roofs?
- Please furnish any other information on this subject that will aid the Committee to make a clear and valuable report.

APPLIANCES FOR REPLACING CARS ON TRACKS.

- 1st.—What means do you use to replace cars on track when in upright position with wheels off?
 - 2d.—When thrown from track, and down on side, what is your mode of uprighting and replacing them?
 - 3d.—When down an embankment, how do you raise them?
 - 4th.—Can you suggest any plan to expedite the work of replacing cars on the track?
 - 5th.—What tools and other devices would you recommend to be carried by trains for purposes named above?
- Any other information, bearing upon the subject, not suggested by the above questions, will be cheerfully received by the Committee. Address replies to the Chairman, W. J. CARLIS, Wilmington, Columbia & Augusta Railroad, Wilmington, N. C. The other committeemen are H. Longest, Richmond, Danville & Piedmont, and J. N. King, Chesapeake & Ohio.

Transportation in Congress.

In the Senate on the 30th:

Mr. Windom, of Minnesota, offered a resolution, which was agreed to, directing the Postmaster-General to report to the Senate the amount of compensation paid to postal-car clerks and employees now employed on the lines between Washington and New York, New York and Boston, New York and Albany and Buffalo and Suspension Bridge; the amount paid for mail transportation on said lines, and what additional compensation the railroads demand for this service; the number of daily express trains on each of said routes, and what reduction in the expense of the mail service, and what increase in the frequency of the service, and greater dispatch in the delivery of the mails can be effected by the withdrawal of the postal cars from said routes, and substituting a more frequent service by transmitting the mails on all express or local trains now running or that may hereafter run over such routes.

Passenger Train Robbers.

A south-bound passenger train on the Arkansas Branch of the St. Louis & Iron Mountain road was stopped by the usual signal at Gad's Hill, Mo., a little signal station, on the afternoon of January 31, and was immediately taken possession of by a band of armed men, who robbed the passengers of all their money and valuables. Before the arrival of the train they had secured the station-master, and had opened the switches so that the train could not proceed, had the engineer attempted to escape. The locality is in a wild and thinly-inhabited country, and the men succeeded in making their escape.



Published Every Saturday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

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Editorial Announcements.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE MINNESOTA RAILROADS.

The annual report of Hon. A. J. Edgerton, Railroad Commissioner of Minnesota, for the year ending with August, 1873, gives statistics from which we are able to deduce the following statement of the extent, capital account, earnings and expenses of the whole system of the State:

At the close of that year there were 1,908.68 miles of railroad in the State, with an equipment consisting of 252 locomotives (0.13 per mile); 117 coaches and 64 baggage, mail and express cars, or 181 passenger-train cars in all (0.09 per mile); 5,356 freight cars (2.8 per mile); 306 "other" cars (chiefly hand cars and other service cars), and 34 snow plows.

The reports of stocks and bonds are not quite complete, the Northern Pacific reporting for its entire property in and out of the State, and the St. Paul & Pacific reporting no stock for the St. Cloud and St. Vincent extensions, and reporting "between \$10,000,000 and \$11,000,000" sold of the \$15,000,000 issued on those extensions. For these we have assigned to Minnesota a proportion according to mileage for the Northern Pacific, which, as the company's rolling stock is nearly all in Minnesota, while it had at the close of the year a floating debt of nearly \$7,000,000, incurred for construction, is certainly not too much; and for the St. Paul & Pacific extensions we have taken \$10,000,000 as the amount outstanding.

With these estimates, which are within the truth, the Minnesota railroad property described above is represented by an aggregate of \$28,564,870 of capital stock and \$78,695,786 of bonds outstanding. The capital stock per mile is quite light, being \$14,966 per mile of road completed, but the bonded debt is extraordinarily heavy, being \$41,335 per mile. This weight of the bonded debt comes chiefly, however, from the lines of four companies—the Southern Minnesota, the St. Paul & Pacific, the Lake Superior & Mississippi and the Northern Pacific. These companies, with 979 miles of road, or a little more than one-half in the State, have an aggregate bonded debt of \$49,035,836, or five-eighths of the whole, it being at the rate of \$50,100 per mile from these companies' lines. For the 930 miles of the other companies the average bonded debt is \$32,107 per mile.

In estimating the earnings, expenses, etc., per mile, we have omitted 109½ miles of the St. Paul & Pacific extensions, which were not worked during the year, and have made the average of the Winona & St. Peter 244 miles, it having been extended during the year covered by the report, and thus have made the average length worked dur-

ing the year 1,756 miles. The gross receipts from the working of this property were \$5,536,105; the working expenses, \$4,424,594, and the net earnings \$1,111,511, while the interest charges (for the lines not worked as well as the others) were \$4,953,478; that is, the net earnings of the Minnesota railroads were less than a quarter of the interest on their bonds (exactly, 22.43 per cent).

The figures for each road are given in the following table:

* Only 35 miles worked.		† Average length worked, about 94 miles.		‡ Average for the 1,756 miles worked.	
Line	Capital Stock	Funded Debt	Gross Earnings	Working Expenses	Net Earnings
St. Paul & Sioux City	\$1,351,600	\$1,591,600	\$309,443	\$453,008	\$76,435
St. Paul & St. Paul	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 1st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 2nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 3rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 4th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 5th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 6th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 7th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 8th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 9th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 10th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 11th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 12th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 13th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 14th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 15th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 16th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 17th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 18th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 19th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 20th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 21st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 22nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 23rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 24th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 25th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 26th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 27th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 28th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 29th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 30th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 31st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 32nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 33rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 34th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 35th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 36th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 37th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 38th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 39th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 40th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 41st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 42nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 43rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 44th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 45th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 46th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 47th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 48th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 49th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 50th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 51st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 52nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 53rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 54th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 55th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 56th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 57th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 58th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 59th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 60th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 61st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 62nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 63rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 64th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 65th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 66th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 67th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 68th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 69th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 70th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 71st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 72nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 73rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 74th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 75th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 76th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 77th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 78th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 79th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 80th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 81st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 82nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 83rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 84th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 85th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 86th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 87th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 88th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 89th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 90th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 91st Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 92nd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 93rd Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 94th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 95th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 96th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 97th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 98th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 99th Div.	1,615,780	1,415,780	73,996	126,852	52,866
St. Paul & Pacific, 100th Div.	1,615,780	1,415,780	73,996	126,852	52,866

Here we have seven lines, with an aggregate of 224 miles of road, which do not even make their working expenses, while not one Minnesota railroad earns enough to pay the interest on its bonds, the deficits varying from \$4,900 down to \$75 per mile, and averaging no less than \$2,013 per mile.

After such a shocking showing as this it is natural to inquire how this immense excess of interest over income is paid. It simply isn't paid. Default has been made by ten of the eighteen lines enumerated, with 1,057 miles of road, and by eight of the fourteen companies; and \$3,747,691 of the aggregate annual interest charge of \$4,953,478, or more than three-fourths of the whole, is due from the defaulting corporations. Only four of these lines have made more than one default as yet, however, and they only had failed to pay interest during the year covered by the report, the amount not paid by them being \$2,122,000.

Taking the system as a whole, including 1,908.68 miles now completed and an average of about 1,756 miles worked during the year, the following are the averages per mile of road:

Capital stock	\$14,966
Funded debt	\$41,335
Gross receipts	\$3,179
Working expenses (80 per cent.)	\$2,519
Net earnings	\$632
Interest charge	\$2,595
Loss after paying working expenses and interest	\$2,013
Train mileage	1,885
Passengers carried one mile	20,312
Tons of freight carried one mile	101,745

In this stocks, debts, interest charges and loss are reckoned per mile of road completed, gross and net receipts and working expenses per average mile worked. Only the passenger mileage of the traffic average is given for all the lines worked, the 440 miles worked by the Northern Pacific (Lake Superior & Mississippi, Stillwater & St. Paul, Minneapolis & Duluth and Minneapolis & St. Louis, besides its own road) making no report of train mileage, and the same with the St. Paul, Stillwater & Taylor's Falls,

the Winona & St. Peter and the Winona, Mankato & New Ulm omitting tonnage mileage. The figures given are the average for the roads which do report. They indicate an extremely light traffic, equivalent to only 33 passengers and 16½ car-loads of freight each way daily over the whole mileage worked.

The temptation to make investments in Minnesota railroads has not been the profits of their traffic, most certainly. There would scarcely have been a line in the State if it had to depend solely on these. But railroad construction has been greatly promoted there

are written by people who see only a very small portion of the subject they write about. Engineers write us to discuss engineering subjects, those engaged in the machinery departments are most interested in mechanics, freight agents read dissertations on rates, and want us to give more of that kind of matter, and stockholders and speculators want us to tell them which stock will pay and which will not, and the prices at which they both sell. It is of course impossible to meet the views of all of these, and therefore the only thing to do is, as far as possible, to give a general review of all subjects connected with railroading, which is what we aim to do.

Letters from readers are valuable, however, in enabling an editor to realize somewhat more clearly the point of view from which they see things, and thus be able to supply them with the information which is wanted or needed. The following letter from a locomotive runner is one of this kind:

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just received your form for subscribers to the RAILROAD GAZETTE. I could do something for you, but first do you know that it takes all we can earn to support our families? If we work 26 days in a month, we earn \$91.00. House rent costs \$12.00, meat \$10.00, groceries \$20.00, wood \$16.00, board on the road \$20.00, making \$78.00, leaving \$13.00 to clothe our families and for other incidentals. So you see we can't have all we want, and they talk of cutting us down at that. When our engines go into the shop, we must lay off, and in slack times are docked for all holidays; so at the end of the year we have the same as when we began, only not quite as much. Now if you will show me where we can curtail on these prices, we will do the best we can to subscribe for your paper, for we consider it the best sheet in America for railroad engineers and railroad science. Do you work for the laboring class and are you willing they should live? If so, make it manifest through your journal, and I will guarantee you a large circulation in this part.

Will you publish what information regarding railroading we may write? We can show where they could economize and save \$1,000 in a better way than by cutting engineers, and would do so if any paper will publish it. The most of them are bought by capitalists. I will see which course you will take in the present trouble, and would like an answer from you too.

Now, regarding our correspondent's domestic economy, we are quite incompetent to give any advice which would be of value to him, excepting to recommend him to keep a careful account of all expenditures, so that at the end of the month he will know where his money went, and can determine what expenses can be curtailed or lessened. We believe if he should do this, he would have little trouble in reducing his expenses 33½ cents per month, which will pay for the GAZETTE.

In reply to his inquiry whether we "work for the laboring class, and are willing they should live," we say we do work for them, and are not only willing they should live, but that there should be more who labor, and that they should all live in as much comfort as possible. But here we begin to see trouble; nearly all men want to live in comfort and luxury themselves, but are not nearly so anxious that others should live in the same way. Our correspondent, for example, manifests a desire that locomotive engineers should have more pay, but he does not seem to be nearly so anxious about clerks and book-keepers, whose average pay is less than the locomotive runners'. Telegraph operators, school-teachers and a thousand other classes are all clamoring for better wages. Now we say, by all means increase their pay if the means can be provided for doing it; but first we must be quite sure there will be money for the pay-roll. The trouble is that there is not enough wealth in the community to reach around, if wages and the comforts which are represented thereby are increased beyond a certain point.

The substance of the complaint of our correspondent and of those who were engaged in the late strike is, we believe, that they are not getting their fair share in the distribution of wages. This we will not now undertake to determine, as it is a very difficult question. We are quite ready to admit, however, that in this world there is much apparent injustice in this respect. Some receive liberal pay seemingly for doing nothing, while others work incessantly for little pay. Many spend all their lives in doing hard and faithful work, and in the end die poor; others who never did "a stroke of work" come into the world and pass out of it in the enjoyment of wealth. All this is granted, and more too; now will our good laboring friends be kind enough to suggest a remedy? The evils of which we have spoken are largely due and directly traceable to the ignorance, the folly, the vice, wickedness and injustice of mankind: now what is the sovereign remedy for all these evils, which are as old as the human race? If the men who struck for higher wages have a remedy, let them at once divulge it. The fact is, all these evils are interwoven into the conditions of our existence, and no strike nor any single organized effort can free us from them. The part which we have to perform in dealing with this subject is to supply, if possible, knowledge to that part of our people engaged in "rail-roading," and in that way make them wiser and, if we can, induce them to be more just. If locomotive runners are underpaid for their work, and we think probably they are, they certainly have the right to combine and unitedly refuse to work for the pay offered, if that method will secure higher wages. The difficulty is that usually it does not accomplish the end sought, as there are plenty of others who are willing to work for the pay offered, and then the strikers resort to means which

are wrong, such as using violence and intimidation.

The question presents itself, however, to most of our readers among that class, not as a social problem, to be reasoned out, but one in which they are individually interested. "How can I increase my wages?" is the inquiry they put to themselves daily. To this our answer would be, especially to young men, by improving the quality of their work and their capacity for it. The following illustration will, perhaps, make our meaning clearer: In the months of August and September there are hundreds of car-loads of peaches and other fruit landed in New York. On inquiry the greatest diversity will be found in the prices for which they sell. The ordinary qualities, which compose the greater portion of those received, sell at very low prices; the better ones for more, and the best or choice varieties at apparently exorbitant figures. Now every person in one sense is engaged in raising fruit, which is his labor. If when he begins he plants poor varieties, or possibly has poor soil, his crop will be of only ordinary quality and command low prices. If, however, in selecting the plants, he chooses carefully and wisely, and then cultivates them with industry and intelligently, his crop will be of the better quality, for which he will get good prices. The same thing is true of a man's capacities; if they are cultivated so as to produce good fruit, so will be his pay. In other words, "As ye sow, so shall ye reap."

It is quite true that often the value of our work is not estimated so accurately as that of fruit, but then we doubt whether railing at "capitalists" will mend the matter. Besides, the members of trades unions have done and are doing much to prevent a just estimate of the work of their members, by insisting that all shall be paid alike, whether good or bad, skillful or stupid. This, to say the least, is very unjust, and manifestly a great wrong to the good men, who must thus help to support the indolent loafers and stupid blunder-heads.

Altogether, we are inclined to believe that if locomotive runners and other working men would spend the effort and zeal they devote in abusing the "bloated capitalists" to gaining knowledge and learning their business, they would be better paid for their expenditure of time and money.

If our correspondent can show how money can be saved to railroads we will be glad to publish the information; we will only give Davy Crockett's advice to "be sure he is right."

The City Steam Railroad Question.

Schemes for New York city railroads are perhaps not quite so numerous this year as last in the Legislature at Albany, where yearly may be found several companies who would have you believe that the only possible obstacle in the way of their working a line which will entirely relieve the city is the privilege of constructing it in, or over, or under certain designated streets; but, having got that privilege (as several have), do nothing more towards availing themselves of it than to make sundry announcements of loans negotiated and contracts let. A more than usually sensible proposition was introduced last Wednesday. This is to have five commissioners appointed, two by the Governor, two by the Supreme Court Judges of the city, and one by the Mayor, who are to examine and report upon all plans submitted, locate the route, and decide whether and to what extent the city should assist in its construction, while the Mayor is authorized to offer a reward of \$50,000 for the plan which shall be adopted.

It may be remembered that this is substantially the plan proposed in these pages about a year ago, for the solution of this question. Year after year, for nearly a quarter of a century, a host, consisting of selfish schemers or irresponsible adventurers—the latter without money or brains, and the former with no other object in view than to further their own selfish interests—have clamored at the Legislature for charters for building steam passenger railroads in the city. Most of the plans proposed have been impracticable, either owing to their enormous cost or to their unskillful design. Nearly all the underground schemes have belonged to the former class, and the Greenwich street and the Gilbert elevated road to the latter. In fact, the last thing which seems to be thought of by those who ask for charters is the employment of a competent engineer. It therefore happens, as it did with the Gilbert elevated road, that when capitalists have the proposed plans examined by competent engineers, they wisely refuse to invest their money.

There is another class of obstructionists in the way, who will doubtless prevent the building of any such road as long as they can. These are the proprietors of the existing horse railroads, some of whom have applied for charters for steam roads, but, it is shrewdly suspected, rather to prevent than to forward the construction of a line which would greatly decrease the traffic of their present property.

Whether any appropriation is proposed to enable the Commissioner to investigate the subject, we do not learn; but we may be sure that without one, and a tolerably liberal one, the subject will not be properly and thoroughly investigated, and the chances will be more than a hundred to one that the best design will not be adopted: no company or individual will spend fifty or a hundred thousand dollars in investigating the subject on the bare (and remote) chance that its plan may be adopted and it given privileges which will make it possible to carry it out and make it profitable. The study of the route alone might well occupy a very capable man a year; for it should cover a study not only of the number but of what we may call the quality of the population of the different districts

of the city, and the prevailing currents of travel within the city.

The great difficulty at present is the want of accurate information concerning the whole subject. Such a commission as the one proposed could investigate it, and by embodying the results of their investigations in a full report, could at least make some intelligent action possible.

There should be at least two competent engineers in the commission, and one large property holder, an eminent lawyer, and perhaps a merchant, or some one interested in the mercantile prosperity of the city. Some of these should be young men, to do the work which older men are very apt to shrink from.

This commission promises more, if the bill can be passed, than anything else which has thus far been proposed, and when the enormous importance of having some system of rapid travelling provided for New York is considered, the popular demand should be such as to insure its prompt adoption.

Punishment for Negligence.

In the revision of the laws of Illinois relating to criminal jurisprudence the following section has been introduced and is likely to be adopted:

"Sec. 49. Of Common Carrier.—Whoever, having personal management or control of or over any steamboat or other public conveyance used for the common carriage of persons, is guilty of gross carelessness or neglect in or relation to the conduct, management or control of such steamboat or other public conveyance, while being so used for the common carriage of persons, whereby the safety of any person shall be endangered, shall be imprisoned in the Penitentiary not exceeding three years, or fined not exceeding \$5,000.

It will be remembered that the conductor and engineman of the coal train, by whose gross inattention to orders the terrible Lemont collision was caused last August, could not be convicted though arrested, and though the conductor was indicted and tried for manslaughter.

Another section interesting to railroad men, and especially to that mild and careful class, the baggagemen, is as follows:

"Sec. 192. Injuring or Destroying Baggage.—If any baggage-master, express agent, stage driver, hackman or any other person whose duty it is to handle, remove or take care of trunks, valises, boxes, packages or parcels, while loading, transporting, unloading, delivering or storing the same, whether or not in the employ of a railway, steamboat or stage company, shall wantonly or recklessly injure or destroy the same, he shall be fined not exceeding \$200."

Probably it would not be necessary to have a new law to make such an offense punishable, the difficulty being usually to find the guilty person, to prove wantonness, and for the traveler to spend the time necessary to conduct a prosecution. A better remedy is discipline strictly maintained by the railroad officers.

THE LIFE OF LOCOMOTIVES is illustrated by a table in the last Reading report, which gives the weight, name of maker, date when first run, miles run in the company's last fiscal year (ending with November last) and total to that date, and condition and duty at date of each of the company's 400 locomotives. The engine which has run furthest is No. 58, which was built by the company, weighs 56,488 lbs., was first run in June, 1859, had run up to the end of last November 420,286 miles, 81,052 of them in the last year, and was on duty in passenger service on the main line.

Nos. 1 and 2 in this list were built in London by Braithwaite & Co., and first run in the Spring of 1838. One of them works still at the wharves and the other at the shops at Richmond, having in their lives run 279,954 and 303,796 miles respectively. Of the 400 locomotives owned by the company, 291 were built by itself at its shops at Reading, 57 at the Baldwin Works, 20 by the old Norris Brothers' Works at Lancaster, Pa., 7 by the late firm of Norris & Son, Philadelphia, 5 by the Rogers Locomotive Works, and the rest by various deceased locomotive works and absorbed railroad companies.

The heaviest locomotive on the road weighs 85,120 lbs., but there are three or four only 3,600 lbs. lighter, and ten of 76,332 lbs. weight, while the favorite weight for coal engines seems to be 72,128 lbs. (32.2 long tons).

THE FIRST BESSEMER RAIL, according to a letter from Mr. R. F. Mushet to *Iron*, was rolled at the Victoria Iron Works from blooms cast by Mr. Mushet for the Ebbw Vale Iron Company, and laid on the Midland Railway at Derby, where traffic was heaviest, early in 1857. At the end of 1867 Mr. Mushet wished to ascertain the traffic over it and, if possible, to buy it. The engineer reported that the rail was not for sale, and that about 250 regular trains and about an equivalent amount in detached engines and tenders passed over the rail daily. Asking for it again, June 16, 1873, it was found that the rail had been taken out and used up about ten days before. Thus the rail lived sixteen years, and carried a total traffic in that time of probably 1,252,000 trains and 1,252,000 detached engines and tenders. The condition of the rail when taken up is not reported, but it probably was pretty well worn out. It was a double-headed rail. Mr. Mushet supposes that an iron rail would probably have lasted not more than six months in that place, so that the steel rail was equivalent to thirty-two iron ones.

THE BLOCK SYSTEM, on the 1,300 miles of the Northeastern Railway of England, according to Mr. Thomas E. Harrison's inaugural address on assuming the duties of President of the Institution of Civil Engineers, will require, when fully applied, 2,000 signal men, or four times as many as formerly. Mr. Harrison also said that the difficulty in obtaining laborers, especially for night work, has made it impossible to get more than two-thirds as much work out of a mineral car than was common three or four years ago, and that an enormous increase of rolling stock in excess of the increase of traffic has thus been made necessary.

New RAILROAD BONDS are in the market again, but not so plentifully, by any means, as before the panic, while most of them are new issues of established roads, and none, so far as we know, of roads not yet built. Lake Shore & Michigan Southern second-mortgage 7s, due in 1903, are offered at 95; New York Central & Hudson River first-mortgage 7s, by dealers who have purchased from the company at prices not advertised; Toledo, Wabash & Western gold 7s at 85; Central Railroad Extension (of Long Island) first-mortgage 7s at 87½; Houston & Texas Central first-mortgage gold 7s; Delaware & Hudson Canal Company first-mortgage 7s.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the laying of track on new railroads as follows:

Cincinnati, Wabash & Michigan.—Extended from Wabash southeastward 19½ miles to Marion, Ind. *St. Paul & Pacific.*—The *Brainerd Extension* has been completed from Brainerd southward 4½ miles.

These extensions, both of which were completed in 1873, make the total for that year 3,857 miles.

NEW PUBLICATIONS.

Wiley's American Iron Trade Manual.—Messrs. John Wiley & Son, of New York, are about to publish a manual of the leading iron industries of the United States, giving descriptions, location and capacity of the different blast furnaces, rolling mills, Bessemer steel and other works, car-wheel, car and locomotive works, steam engine and machine works, iron bridge works and stove foundries. The work is to be compiled by Mr. Thomas Dunlap, of Philadelphia, whose connection with the National Association of Iron Manufacturers should give him exceptional facilities for doing the work accurately. The book is to be a small quarto of 500 pages or more. Such a work is very much needed, and we are glad to see it attempted by a reputable publishing firm.

The Analyst.—We desire to commend to the attention of our mathematical readers—and our columns frequently testify that we have not a few of them—this new periodical, published at Des Moines, Iowa, by Prof. J. E. Hendricks, who has made several contributions to these columns which mathematical readers will remember. It is hardly creditable to this great country, so full of schools and students, that it has no periodical devoted to mathematical science. It has had such, and some of them very creditable, notably the *Mathematical Monthly*, which is the only one students of this generation will remember. This last named periodical was conducted by Prof. John D. Bunkle, now of the Massachusetts Institute of Technology, and was a credit to the editor certainly, though hardly to the country, which failed to support it sufficiently, and it died after having been published three years, we believe.

The Analyst is an octavo of 16 pages (like those of the monthly magazines) and is to be published for a year at least, whatever may be its success in obtaining subscribers. It ought to succeed, and one would think that it easily might if the lovers of mathematical science would unite in its support. Progress in mathematics may be greatly furthered by such a periodical, in which original investigations and processes may be quickly made known to nearly all those who are likely to make such investigations and discover such processes.

The Engineering and Mining Journal, which has for several years been one of the most thoroughly respectable and able of American technical journals, has greatly increased its usefulness and strength as a journal of mining and metallurgical interests by the acquisition as one of its editors of Mr. Richard P. Rothwell, C. E., who is an engineer of rare accomplishments and has had charge of important coal and iron interests for many years. Coal and iron are to be Mr. Rothwell's specialty in the *Engineering and Mining Journal*, which has always been strong in respect to gold and silver mining and smelting. It is encouraging to see gentlemen of Mr. Rothwell's rank in the profession giving their attention to editing technical journals, which in this country too often are committed to the charge of men who are utterly ignorant of their journals' specialty—and of almost everything else—being largely men who have been tried and found wanting on general newspapers. But the time seems near at hand when an editor of a special journal will be expected to know something of the subjects which he writes about.

A Note on the Resistance of Materials.

BY PROF. ROBERT H. THURSTON.

[Read before the American Society of Civil Engineers, November 19, 1873.]

On the 13th ultimo, an apparatus for determining the torsional resistance of materials, which I had designed for use, in illustration of my course of instruction, and to which I had fitted an automatic recording attachment, was exhibited to the National Academy of Science, at the late session held at this place, for the purpose of showing the peculiar adaptability of the machine for the determination and analysis of the action of physical and molecular forces in resisting stress, and to illustrate the bearing of experiments already made upon scientific investigations of molecular relations.

At the close of the meeting, a test piece of wrought-iron was left in the machine, exposed to a strain which had passed the limit of elasticity, and with a distortion of 45 degrees, the intention being to determine whether, as has been suspected by some writers and by many engineers, "viscosity" is a property of solids, whether a flow of "solids" could occur under long-continued strain just equilibrating, when first applied, the resisting power of the material, or whether the "polarity" of Professor Henry is an absolutely unrelaxing force.

The metal was left under strain twenty-four hours, and had not then yielded in the slightest degree. This result, and the results of other similar experiments since made confirming it, indicate that metal strained far beyond the limit of elasticity, as above described, does not lose its power of resisting unintermitted static stress.

The important bearing of this fact upon the availability of iron, and of steel, which also behaves similarly, for use in constructions exposed to severe strains, is readily seen.

After noting the result obtained as stated, it was attempted to still further distort the test piece, when the unexpected dis-

covery was made that its resisting power was greater than when left the previous day, an increase of resistance being recorded amounting to about 25 per cent. of the maximum registered the preceding day, and approximating closely to the ultimate resistance of the material. Repeated experiments, continued up to the date of writing, confirm the following previously undemonstrated principle: that iron and steel, if strained beyond the limit of elasticity, and left under the action of the distorting force which has been found just capable of equilibrating their power of resistance, gain resisting power to a degree which has a limit in amount approximating closely, if not coinciding with the ultimate resistance of the material, and which had a limit, as to time, in experiments hitherto made, of three or four days.

Releasing the piece entirely and again submitting it to the same force immediately, does not produce this strengthening action.

There is some evidence that is confirmed by theoretical dynamic principles, that the increase of strength noted is not accompanied by a change of resilience, but that the gain of resisting power is at the expense of a proportional amount of ductility.

The diagrams obtained during this research will be presented at a future time, when the investigation shall have been completed.

The interest and importance attaching to the discovery of the principles above enunciated, to our profession as well as to science, will, I hope, justify the presentation of this note.

* Mon. H. Tresca; Sur l'Ecoulement des Corps Solides. Paris, 1869-73.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—At the annual meeting of the Martinsburg & Potomac Railroad Company in Martinsburg, West Va., January 28, Thomas B. Kennedy was chosen President with the following directors: Charles J. Faulkner, E. J. Troxell, J. Q. A. Nadenbousch, Barnet Cushman, of West Virginia; Daniel O. Gehr, John Stewart, O. N. Lull, W. L. Chambers, Frederick Watts, of Pennsylvania.

—The directors of the new Brunswick & Albany Railroad Company, organized by the purchasers of the road at the recent sale, are as follows: J. de Neuville, Gilead A. Smith, George B. Bliss, William Martens, Robert L. Bennett, New York; B. G. Dockett, Albany, Ga.; William A. Lowe, Atlanta, Ga. Mr. J. de Neuville is President.

—At the annual meeting of the Atlantic & Pacific Telegraph Company, January 28, the following directors were elected: S. L. M. Barlow, George S. Bowdoin, George Bliss, George H. Brown, H. G. Chapman, W. H. Clay, Sidney Dillon, R. R. Graves, W. H. Gunion, J. B. Hodgekin, C. P. Huntington, L. P. Morton, J. H. Mortimer, G. G. Sampson, W. W. Sherman, W. J. Syme, Henry M. Taber, William R. Travers, John G. Vose, A. F. Wilmarth, New York; Oliver Ames, John R. Duff, Boston; J. H. Devereux, H. M. Flagler, Waldemar Otis, Cleveland, O.; C. G. Hammond, A. B. Meeker, Chicago; Emory Wendell, Detroit, Mich.; R. M. Shoemaker, Cincinnati; H. D. Walbridge, Toledo, O.; N. C. Simons, Buffalo, N. Y.; S. H. Marks, Lockport, N. Y.; H. G. Hamilton, Rochester, N. Y.; Russell Wheeler, Utica, N. Y.; Cheney Ames, Oswego, N. Y.; James Hendricks, Albany, N. Y.; W. W. Shippen, Hoboken, N. J.; John Barker, Brooklyn, N. Y.; C. S. Busnell, New Haven, Conn.

—Mr. F. H. Kingsbury, heretofore Superintendent of the Union, Allentown and National freight lines, has been appointed Assistant General Freight Agent of the Pittsburgh, Cincinnati & St. Louis Railway and leased lines, with office at Columbus, O. Freight agents in charge of the several divisions of this road will report to him. Mr. William Stewart remains General Freight Agent, with office at Pittsburgh.

—At the annual meeting of the Fitchburg Railroad Company in Boston, January 27, the following directors were elected: Alvah Crocker, Fitchburg, Mass.; William B. Stearns, Charlestown, Mass.; Peter B. Brigham, Beth Bennis, Robert Codman, Boston. Mr. Codman is a new director, replacing Cyrus Wakefield, deceased.

—Mr. William Oden Hughart, formerly President of the Pittsburgh & Connellsville Railroad Company, and for a year past Manager of the Southern Railway Security Company, has been chosen President of the Grand Rapids & Indiana Railroad Company. His office will be at Grand Rapids, Mich.

—Mr. Amos Rodgers, formerly a conductor on the road, has been appointed Master of Transportation of the Jeffersonville, Madison & Indianapolis Railroad.

—The two branches of the Baltimore City Council met in joint convention, January 28, and elected James Webb, Simon G. Kemp, A. R. May, Charles E. Nicolai, Thomas White, Robert T. Banks and John F. Wiley city directors of the Baltimore & Ohio Railroad Company.

—The board of directors of the Southern Maryland Railroad Company met in Washington, January 27, and elected the following officers for the ensuing year: President, S. S. Smoot; Treasurer, John C. McKelden, President Second National Bank of Washington; Secretary, Chas. H. Winder; counsel and solicitors, Hon. B. G. Harris and Gen. T. T. Crittenden.

—Mr. Robert Fulton, late Train Dispatcher on the Lake Superior & Mississippi Division of the Northern Pacific Railroad, has been appointed Train Dispatcher on the Union Pacific, with office at Omaha, Neb.

—Mr. J. H. Stewart, heretofore Superintendent of the Madison Division of the Chicago & Northwestern and of the Winona & St. Peter Railroad, will hereafter be Superintendent of the Winona & St. Peter only, with office at Winona, Minn.

—At the annual meeting of the Paducah & Memphis Railroad Company in Paducah, Ky., January 21, the following directors were elected: Extine Norton, A. M. West, J. S. Rogers, New York; H. S. McComb, Wilmington, Del.; L. S. Trimble, Paducah, Ky.; H. E. Garth, James Elder, A. T. Lacey, John Overton, Jr., Memphis, Tenn. The board met in Memphis, January 27, and re-elected the old officers, as follows: President, Extine Norton; Vice-President, L. S. Trimble; Treasurer, John L. Norton; Secretary, M. Monsarrat.

—At the annual meeting of the New Castle & Franklin Railroad Company in New Castle, Pa., recently, George N. Boyles, Samuel McDowell, Isaac Phillips and R. W. Cummings, of Lawrence Co., Pa.; Hon. Wm. Stewart, Beriah Magoffin and S. B. Mason, of Mercer County, Pa., were chosen directors. A. L. Crawford was elected President, and George C. Reis, Vice-President.

—Mr. C. L. Burlingame, late of the Toledo, Peoria & Warsaw road, has been appointed Master Mechanic at Houston, Tex., on the International & Great Northern Railroad.

—The officers of the United States Engineer Corps detailed to examine and report on the James River & Kanawha Canal Extension project, are Col. J. G. Barnard and Majors Q. A. Gilmore, W. P. Craigill and Godfrey Weitzell, with Lieut. Thomas Turtle as recorder. Mr. Benjamin H. Latrobe, of Baltimore, the distinguished engineer, has consented to serve as a member of the board, which is to meet in Richmond, Va., February 4.

—At the annual meeting of the Little Miami Railroad Company in Cincinnati, O., January 27, the following directors

were elected: Charles P. Cassidy, Edmund Dexter, Henry Hanna, L. B. Harrison, Joseph H. Rogers, Henry E. Spencer, A. D. Bullock, R. A. Holden, Cincinnati; Hugh J. Jewett, Jos. ph R. Swan, Columbus, O.; A. Hivling, Xenia, O.; Wm. H. Clement, Morrow, O. A. D. Bullock and R. A. Holden are new directors, taking the places of J. C. Butler (deceased) and Richard Lewis.

—The new board of directors of the Montpelier & Wells River Railroad Company has elected the following officers: President, I. N. Hall, Groton, Vt.; Vice-President, James W. Brock, Montpelier, Vt.; Managing Director, J. G. French, Montpelier, Vt.; Clerk and Treasurer, Joel Foster, Jr., Montpelier, Vt.; Finance Committee, Messrs. Foster, Shurtleff and Brock.

—At the annual meeting of the Dakota & Northwestern Railroad Company in Yankton, Dak., January 6, J. P. Kidder, W. A. Burleigh, W. Tripp, G. Stickney, M. K. Armstrong, J. A. Potter and W. P. Lyman were elected directors. The board elected: J. P. Kidder, President; W. Tripp, Vice-President; J. A. Potter, Secretary; M. K. Armstrong, Treasurer; G. Stickney, Engineer, and N. Miner, Attorney.

—Mr. George Payson, of the law firm of King, Scott & Payson, Chicago, has been appointed Attorney for the Western Railroad Association.

—At the annual meeting of the Galveston, Houston & Henderson Railroad Company, January 28, the following directors were elected: E. S. Wood, W. H. Nichols, H. B. Andrews, John Sealy, A. P. Lufkin, Galveston, Tex.; William J. Hutchins, G. A. Grow, T. W. House, J. H. Burnett, Houston, Tex.; H. M. Hoxie, Hearne, Tex.; Moses Taylor, New York; T. W. Peirce, Boston. Messrs. Taylor, Nichols, Andrews, Grow, House, Hoxie and Burnett are new directors. Mr. Grow is President, Mr. Hoxie General Superintendent, Mr. Burnett Land Agent, and Messrs. Taylor, House and Hutchins directors of the International & Great Northern Company, which has apparently secured half the board. Mr. Hutchins is also a director of the Houston & Texas Central.

—Mr. J. F. Curtis, heretofore General Foreman of the Kalama shops, has been appointed Master Mechanic of the Pacific Division of the Northern Pacific Railroad.

—At the annual meeting of the New England General Freight Agents' Association in Boston, January 21, the following officers were elected for the ensuing year: President, H. S. Marcy, Delaware & Hudson Canal; Vice-President, W. J. C. Kenney, Boston & Maine; Secretary, E. L. Whitford, Northern of New Hampshire.

—Mr. M. W. Goss has been appointed General Freight Agent of the Chesapeake & Ohio Railroad Company, with office at Richmond, Va.

—At the annual meeting of the Providence & Worcester Railroad Company in Providence, February 2, the old board of directors were re-elected, as follows: William S. Slater, Earle P. Mason, John Carter Brown, James Y. Smith, George A. Leete, John R. Balch, Providence, R. I.; Isaac Davis, Henry Chapin, Elijah B. Stoddard, Worcester, Mass.; Paul Whittin, John C. Whittin, Whitinsville, Mass.; Eben B. Phillips, Boston, Mass.; Estus Lamb, Blackstone, Mass.; Gideon L. Spencer, Pawtucket, R. I.; Lyman A. Cook, Woonsocket, R. I.

—At the annual meeting of the Hartford & New York Steamboat Company recently the following directors were chosen: Charles Benton, Elisha T. Smith, Charles H. Northam, Hartford, Conn.; C. F. Browning, Henry G. Hubbard, Middletown, Conn.; William H. Goodspeed, East Haddam, Conn.; Henry Gildersleeve, Portland, Conn. Charles Benton was chosen President; W. H. Goodspeed, Vice-President; A. W. Warner, Secretary and Treasurer.

—At the annual meeting of the Eastern Railroad Company in Boston, February 2, the following directors were elected: Samuel Hooper, Franklin Haven, Thornton K. Lathrop, Benjamin F. Stevens, Boston; Henry L. Williams, Salem, Mass.; John Wooldredge, Lynn, Mass.; Frank Jones, Portsmouth, N. H.; James W. Johnson, Enfield, N. H.; Anson P. Merrill, Readfield, Me.

TRAFFIC AND EARNINGS.

—The earnings of the St. Louis & Southeastern Railway (consolidated) for the third week in January were: 1874, \$30,070.13; 1873, \$21,190.45; increase, \$8,879.68, or 41½ per cent.

—The earnings of the Erie Railway for the third week in January were: 1874, \$380,548; 1873, \$343,909; increase, \$36,639, or 10½ per cent.

—The Sioux City (Ia.) Times gives the following statement of the earnings of the Dakota Southern Railroad for the eleven months ending December 31, 1873:

Earnings (\$2.519 per mile).....	\$163,724.90
Expenses (48.9 per cent.).....	80,465.47
Net earnings (\$1.287 per mile).....	\$83,259.43

—The Jackson (Mich.) Citizen publishes the following statement of the business of the Northern Division of the Jackson, Lansing & Saginaw Railroad for the year 1873: 6,742 carloads of lumber, 53,986,000 feet; 1,156 carloads of salt, 80,920 barrels; 673 carloads of logs; 547 carloads of shingles, 24,615,000; 187 carloads of lath, 8,415,000 pieces; 256 carloads of plaster; 24 carloads of hoops, 2,780,000; 46 carloads of staves, 92,000; 28 carloads of telegraph poles.

—The earnings of the Central Railroad of New Jersey for the year 1873 were as follows:

Earnings (\$30.342 per mile).....	\$8,229,571.94
Expenses (49.17 per cent.).....	4,341,210.57
Net earnings (\$15.424 per mile).....	\$4,488,361.37

—The earnings of the Boston, Barre & Gardner Railroad for the year ending September 30, 1873, were:

Earnings (\$3.684 per mile).....	\$95,796
Expenses (84.07 per cent.).....	80,535
Net earnings (\$1.587 per mile).....	\$15,261

There is an increase of 27½ per cent. in gross earnings, and 188 per cent. in net earnings over the preceding year.

—The earnings of the Michigan Central Railroad for the third week in January were: 1874, \$130,937; 1873, \$94,398; increase, \$36,539, or 38½ per cent.

—The earnings of the Chicago & Northwestern Railway for the third week in January were: 1874, \$204,503; 1873, \$181,515; increase, \$22,988, or 12½ per cent.

—The earnings of the Great Western Railway, of Canada for the week ending January 9 were: 1874, \$24,915; 1873, \$18,012; increase, \$6,903, or 38½ per cent.

—The earnings of the Grand Trunk Railway for the week ending January 10 were: 1874, \$40,600; 1873, \$27,600; increase, \$13,000, or 47½ per cent.

—The earnings of the Providence, Warren & Bristol Railroad for the year ending November 30, 1873, were:

Earnings (\$8.408 per mile).....	\$113,504.76
Expenditures, including interest, etc.....	104,241.76
Surplus.....	\$9,263.00

—The shipments of through freight eastward over the Central Pacific Railroad for the month of December were: from San Francisco, 2,370 tons; Sacramento, 758 tons; other points, 61 tons; total, 3,184 tons, or 316 car loads. The principal

items were: wool, 829 tons; barley, 675 tons; tea, 436 tons; coffee, 419 tons.

—The earnings of the Marietta & Cincinnati Railroad for the first three weeks in January were: 1874, \$113,584; 1873, \$111,603; increase, \$1,981, or 1 7/8 per cent.

—During the year 1873, the Oregon & California Railroad carried 53,771 tons of freight northward to Portland, and 9,896 tons southward, a total tonnage of 63,667 tons, or 6,367 car loads.

—The coal tonnage of the Cumberland & Pennsylvania Railroad for the year ending December 31 was: 1873, 2,265,379 tons; 1872, 1,918,514 tons; increase, 346,865 tons, or 18 1/16 per cent. The coal tonnage of the Cumberland Branch Railroad for the same period was: 1873, 227,947 tons; 1872, 230,152 tons; decrease, 2,205 tons, or 1 1/4 per cent.

PERSONAL

—Mr. C. W. Douglas has resigned his position as General Superintendent of the New York & Oswego Midland Railroad. It is reported that he will take his old place on the South Side Railroad. No successor will be appointed to Mr. Douglas on the Midland, the division superintendents reporting directly to Mr. J. G. Stevens, Receiver and General Manager.

—Mr. Coe F. Young, General Manager of the Delaware & Hudson Canal Company's railroad lines, and wife celebrated their "silver wedding" at their residence in Honesdale, Pa., January 22.

—Mr. J. F. Fringer, for some time past General Western Agent of the Ohio & Mississippi Railway with office at Kansas City, Mo., became insane recently and had to be confined in the Missouri lunatic asylum.

—Mr. Thomas B. Morris has resigned his position as Constructing Engineer of the Pacific Division of the Northern Pacific Railroad, and is now engaged in preparing estimates of the cost of the projected Seattle & Walla Walla Railroad.

CHICAGO RAILROAD NEWS.

Illinois Central.

As we announced at the time, this company agreed to purchase annually \$200,000 of the Mississippi Central and the New Orleans, Jackson & Great Northern Company's bonds, issued for the purpose of improving those roads and completing the extension to Cairo. The holders of these bonds have proposed to exchange the whole issue (\$8,000,000), bearing 7 per cent. interest, for an equal amount of Illinois Central bonds bearing 5 per cent. interest, and the offer has been accepted by the Illinois Central. The Central has now merely a trifling bonded debt, so that these new 5-per-cent. will be among the best possible securities, and will doubtless sell well in England, where most of the Illinois Central stock is held; the company will receive \$420,000 yearly from the Southern companies, and pay out \$300,000 yearly as interest on the purchase money, so that it will make a clean profit of \$120,000 yearly on the operation, if the other companies meet their engagements, which they ought to be able to do.

In the case of the mandamus against the trustees, to compel them to sell at auction the unused portion of the land-grant, the Illinois Supreme Court has postponed the hearing to the May term of the Court, at Mount Vernon.

The City Council of Dubuque, Ia., having asked the company's consent to the flooring of the railroad bridge over the Mississippi at that place, so that it can be used as a wagon bridge, the company has consented, on condition that the city will accept all liability for any accidents which may occur.

This company will issue, on February 8, excursion tickets to New Orleans and return for \$40. They will be issued from February 8 to February 14, and will be good for return passage until March 14. The excursion tickets are to accommodate all such persons as shall wish to attend the Carnival of Mardi Gras at New Orleans on February 17.

Lake Shore Depot.

The new baggage rooms and passenger depot of the Illinois Central and Michigan Central Railroad companies is nearly done. It will be completed by February 7, when passengers will again be transferred there as usual. At present they are transferred at the Twenty-second street depot. The new buildings cover exactly the same space as the ones that were burned two weeks ago; but they are much more substantial, being of brick, while the old buildings were almost entirely wooden.

OLD AND NEW ROADS.

Cincinnati, Rockport & Southwestern.

A proposition to appropriate a fund in aid of this road having been rejected by the county commissioners, the banks of Rockport, Ind., are making arrangements to raise a fund of \$40,000 to secure the construction of the road.

Cincinnati Southern.

The trustees have held conferences with a committee of citizens of Covington, Ky., with reference to a contribution from that town to secure the construction of a bridge across the Ohio from Covington to Cincinnati. Negotiations are also pending for the use of the Newport bridge over the Ohio. The Cincinnati Chamber of Commerce has adopted the report of its committee advising its trustees to make terms, if favorable ones are offered, for the use of the Newport & Cincinnati railroad bridge rather than to build a new bridge.

The bids for the section from South Danville, Ky., to Obitwood were opened January 26. Over 200 bids were received for the work, or portions of it.

Paterson & Newark.

A meeting of the old stockholders was to be held in Newark, N. J., February 5, to consider whether it is advisable to take steps to set aside the sale of the road to the Erie Company.

Grand Rapids & Indiana.

The Continental Improvement Company, which built and has heretofore operated this road, has formally transferred possession of the road to the Grand Rapids & Indiana Railroad Company, the road being now completed.

Louisville & Nashville.

It is stated that this company, in connection with the Pullman Car Company has purchased the noted Mammoth Cave property, and that a branch line will be built at once from Glasgow Junction, Ky., to a point near the cave. This branch will be about nine miles long.

Hopkinton.

A bill is before the Massachusetts Legislature to reveal the act authorizing this company to extend its road northeastward through Framingham, Natick and Weston, and to mortgage its road.

Fitchburg.

At the annual meeting in Boston, January 27, the stockholders voted to authorize the directors to issue additional stock to the amount of \$1,000,000. It is provided that, as a substitute for any or all of such stock, the directors may issue bonds having not more than 20 years to run and bearing not more

than 7 per cent. interest. The total amount of stocks and bonds issued must not exceed \$1,000,000.

Boston & Maine.

The entire issue of \$300,000 new bonds was awarded in Boston January 24, at 101 and 101 1/2. Bids for over \$500,000 were received.

New Jersey Southern.

It is announced that Mr. Stockton, the Receiver, has made a temporary lease of the road, to run until November 1, 1874, to the Long Branch & Sea Shore Railroad Company. The latter company owns the road from Sandy Hook to Long Branch, which has for some years been leased to the New Jersey Southern Company, but which was taken possession of recently by the stockholders, the lease having failed to pay the rent. The road is to be put in operation in a few days. It is not stated whether the lease includes the Vineland and Pemberton & New York roads, both of which were leased and operated by the New Jersey Southern.

The affairs of the company are to be investigated by the Railroad Committee of the New Jersey Legislature.

Central, of New Jersey.

The convertible bonds have been added to the list of the New York Stock Exchange. These bonds amount to \$5,000,000, have 30 years to run from November 1, 1872, and are convertible into stock at par between November 1, 1875, and November 1, 1877.

Vineland & Atlantic City.

It is proposed to build a railroad from Vineland, N. J., eastward through May's Landing to Absecon or Atlantic City, a distance of about 35 miles.

South Mountain & Boston.

Work on the grading is being pushed forward in the neighborhood of Stillwater, N. J.

New London Northern.

A new machine shop, a round-house to hold 20 engines, and a large new wharf, are being built at New London, Conn.

Hannibal & St. Joseph.

About \$1,500,000 of the Missouri State bonds issued in aid of this road fall due within the next year. The company has asked the State Legislature to meet these by an issue of new bonds to bear the same rate of interest. The reason given is that the company is making arrangements to build an extension of its road to St. Louis, and will be prevented from doing so if it is obliged to pay these bonds.

Rome, Watertown & Ogdensburg.

The Oswego (N. Y.) Times states that the Syracuse Northern Company has offered to lease its road to this company, provided the lessee will assume the interest on the bonded debt. These terms were declined, but the Rome, Watertown & Ogdensburg Company is willing to consolidate on a fair basis. Should consolidation be refused, it is stated that the Rome, Watertown & Ogdensburg Company will build a line from Mexico, N. Y., on its Oswego Branch, southwest to Baldwinsville on the Oswego & Syracuse road. This branch would be about 24 miles long, and would give the road a pretty direct connection with Syracuse.

Rutland.

The annual meeting of this company was held in Rutland, Vt., January 27. After some discussion it was voted to postpone the election of directors until July 28.

Wilmington & Reading.

Regular trains commenced running over the new extension from Birdsboro to Reading February 2.

Nashville, Chattanooga & St. Louis.

This company paid into the treasury of the State of Tennessee, January 27, \$109,000 of old Nashville & Chattanooga bonds indorsed by the State, reducing by this amount its indebtedness to the State.

Pinconning & Kaiser.

This road was recently completed from Pinconning, Mich., on the Jackson, Lansing & Saginaw, to Kaiser, on the headwaters of the Kawkawlin River, a distance of 11 miles. It is a wooden road and is built by gaining timbers, hewed flat, into heavy ties. On these timbers are pinned the rails, which are of maple, three by five inches. A locomotive is used which draws six cars at a speed of 12 miles per hour. The road, which is used to bring out lumber, cost about \$2,000 per mile. It is to be shortly extended from Pinconning eastward to Saginaw Bay, some three miles. It is also proposed to extend it from Kaiser southwest to Midland, on the Flint & Pere Marquette road, a distance of 11 miles. The road is owned by the lumber firm of Van Etten, Kaiser & Co., of Pinconning.

Richmond & Danville.

The Judiciary Committee of the House of Representatives are again inquiring into the question of the ownership of the Piedmont road from Danville to Greensboro, which forms part of this road and was built during the war. It is said that fresh evidence has been discovered to prove that it was built by the Confederate States Government, and is consequently now the property of the United States.

Vermont & Massachusetts.

In consequence of the lease to the Fitchburg Company, the general ticket office has been moved to Boston. The office of the freight department still remains at Fitchburg.

Wisconsin Central.

The company has petitioned the Wisconsin Legislature to extend the time for the completion of the road.

New York & Philadelphia.

A Philadelphia dispatch states that a private conference has been held in that city by representatives of the New Jersey Central, North Pennsylvania and Baltimore & Ohio companies to arrange for the completion of a new line from New York to Philadelphia. This line, it is said, is to pass over the New Jersey Central to Somerville, thence over the South Branch road to Flemington and an extension of that road to the Delaware, thence over the Doylestown Branch, (which is to be extended to the Delaware) and the main line of the North Pennsylvania to Philadelphia. A company has already been organized to build the line from Flemington, N. J., to the Delaware.

St. Croix Land Grant.

The bill now pending before the Wisconsin Legislature provides that the grant shall be given to the North Wisconsin Railroad Company, that company to build 40 miles the first year and 20 miles per year thereafter till the road is finished to Lake Superior. The company is to give security for the performance of its part of the contract to the amount of \$5,000 per mile for the first 40 miles and \$2,000 per mile thereafter.

Easton & Amboy.

The annual report of the Chief Engineer of the Lehigh Valley Railroad states that the work on the Easton & Amboy road has been retarded by unexpected difficulties at the tunnel through the Musconetcong Mountain. The heading from the east end of the tunnel has been driven in 1,220 feet and the enlargement carried forward 622 feet. The rock through which this heading has passed is of singular hardness. The slope near the west end has

been sunk to grade and driven through limestone 125 feet west and 325 feet east. A heavy vein of water was struck, which made it necessary to sink a shaft near the west end and run a drift through to the open cut to secure drainage. There is now less than 2,400 feet between headings, and it is believed the tunnel can be completed in 1874.

Work on the lighter portions of the road was suspended in October, but the heavier work is progressing. Ties and rails are contracted for and track-laying will be commenced in the Spring. The material for the wharves at Perth Amboy has been contracted for, most of the piles for two wharves driven, and a large amount of material for coal trestles delivered.

Up to November 30, \$1,956,919.38 has been expended for grading and masonry, and \$840,276.57 for right of way and real estate.

Pennsylvania—Amboy Division.

It is reported that a line some 14 miles long will be built this season from Farmingdale, N. J., the crossing of the Freehold & Jamesburg and New Jersey Southern roads, to Long Branch. This will enable the Pennsylvania Railroad Company to run its cars from Philadelphia to Long Branch over its own lines. The proposed line passes over a level country and could be graded very cheaply. It would, however, make a very indirect route for travel from New York to Long Branch.

Dividends.

The Atlantic & Pacific Railroad Company, lessee, will pay the regular quarterly dividend of 1 1/4 per cent. on the stock of the Pacific Railroad Company of Missouri, at its office in New York, February 20. Transfer books are closed from February 5.

The Middlesex Central Railroad Company, whose road is leased to the Boston & Lowell Company, paid a dividend of \$3 per share February 2.

The Boston & Maine and Eastern Controversy.

At the annual meeting of the Eastern Railroad Company in Boston, February 2, it was announced that, though no agreement had been actually signed, yet an arrangement had been virtually agreed upon which will end the long-standing fight between these two companies. This arrangement provides that all the competing business of the two roads shall be done under the direction of an executive committee composed of three directors from each board, which shall have power to regulate the hours of running through trains and fix fares and freight rates which shall be the same on both roads. The road which actually does the business shall receive a fixed percentage, the remainder of the actual profits to be divided equally. A board of audit is to be appointed to watch the business and decide what is competing business, and no effort is to be made to divert traffic from one road to the other. The agreement will probably be shortly submitted to the stockholders of both companies for their approval.

Davenport Union.

Estimates have been prepared for the cost of this road, which is to bring the Davenport & St. Paul into the city of Davenport, Ia. Two lines have been surveyed, the estimated cost of one being \$97,000, and of the other, \$77,000. The directors of the Davenport & St. Paul Company have announced their willingness to co-operate with the new company.

Vermont Central.

As the iron bridge over the Winooksi River, near Waterbury, Vt., was being tested, January 30, the western span fell, carrying with it four cars loaded with iron and said to weigh 213 tons which were on it at the time. The bridge had not yet been accepted, so that the loss falls on the contractor. The cause of the failure is stated in the dispatch to be defective iron in the lower chord.

Eastern.

At the annual meeting in Boston, February 2, the contract with the Maine Central Company was submitted. The contract is for 999 years and provides that the two roads shall be operated as one, and after deducting all operating expenses, rents, taxes, interest and other authorized payments, the net earnings shall be so divided that the Maine Central shall receive for dividends on each share of its stock four-fifths as much as is paid on each share of the Eastern, Eastern of New Hampshire and Portsmouth, Great Falls & Conway stock, and, whenever a consolidation can be legally effected, each share of the Maine Central stock shall be put into the consolidated company at four-fifths of the valuation of each share of the other companies. The agreement with the Boston & Maine (noted elsewhere) was also referred to.

A temporary bridge has been completed over the Saco River at Biddeford, Me., to replace the one recently burned. The permanent bridge is to be commenced as soon as possible, and is to be an iron truss bridge with two spans of 100 feet each and three of 132 feet each.

Milwaukee & St. Paul.

The directors have declared a dividend of 7 per cent. on the preferred stock, payable in the new consolidated bonds, and have passed a resolution declaring that \$1,752,000 has been earned during the year by the common stock and pledging the company to divide that amount before paying more than 7 per cent. on the preferred stock. The books of the company are to be opened from February 14 to March 1 to procure the assent of the stockholders to the new mortgage for \$35,000,000, in which all classes of outstanding bonds are to be funded, and also their assent to the dividend.

Green Bay & Minnesota.

Surveys are being made for a short branch line from the junction with the La Crosse, Trempealeau & Prescott road (five miles from Winona) to the Mississippi, where an elevator is to be built on the eastern bank.

Lafayette, Bloomington & Mississippi.

The township board of directors, chosen at the recent meeting, claims to represent all the stock legally issued. It is alleged that of the total issue of \$1,000,000 of stock only 4,670 shares were legal, and that the other 5,330 shares, which were transferred to the Toledo, Wabash & Western Company by the conditions of the lease to that company, were issued without any consideration and are illegal. Legal proceedings are to be commenced at once to test the validity of this last issue of stock.

Grand Rapids & East Saginaw.

The Grand Rapids (Mich.) Eagle says that the contract for the construction of this road has been let to a company of Chicago capitalists and that surveyors are now staking out the section from Maple Rapids to the crossing of the Jackson, Lansing & Saginaw. The road is to be 100 miles long, from Grand Rapids east by north to East Saginaw.

Grand Trunk.

Some trouble has arisen with regard to the company's lands at Port Huron, Mich. The company purchased 60 acres of land at that point from the United States, the land being part of the Fort Gratiot reservation, and being sold with certain restrictions. It is now claimed that no changes or improvements can be made on the lands without the approval of the military authorities, which claim the company is disposed to resist.

Keokuk & Des Moines.

The holders of \$2,292,000 out of \$2,310,000 of the old Des Moines Valley first-mortgage bonds have joined in the organization of this new company, and have deposited their bonds with the Purchasing Committee to be used in payment for the